



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-------------------------|------------------------|
| 10/766,976 | 01/29/2004 | Peng Chang | SAR-14948 | 4351 |
| 58882 7590 03/20/2009 PATENT DOCKET ADMINISTRATOR LOWENSTEIN SANDLER P.C. 65 LIVINGSTON AVENUE ROSELAND, NJ 07068 | | | | |
| | | | EXAMINER LE, BRIAN Q | |
| | | | ART UNIT 2624 | PAPER NUMBER |
| | | | MAIL DATE 03/20/2009 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/766,976

Applicant(s)

CHANG ET AL.

Examiner

BRIAN Q. LE

Art Unit

2624

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on interview on 03/12/2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 20-23 is/are rejected.
- 7) ☒ Claim(s) 17-19 and 24-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Response to Amendment and Arguments

1. Applicant's amendment filed 02/10/2009, has been entered and made of record.
2. Regarding the rejection of claims 1-12 under 35 U.S.C. 101, the amendment does not overcome the rejection and thus the rejection is maintained. Further explanation will be disclosed under 35 U.S.C. 101's Rejection Section.
3. Applicant's arguments, see Remarks (pages 9-14), filed 02/10/2009, with respect to the rejection(s) of claim(s) 1-5, 7, 13-14, 16, 20-23 under 35 U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Nicolas et al. U.S. Patent No. 7,139,423.

The Examiner believes that all the arguments of the Applicant have been properly addressed and explained. Thus, the rejections of all of the claims are maintained.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
2. Claim(s) 1-12 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. The Federal Circuit¹, relying upon Supreme Court precedent², has indicated that a statutory "process" under 35 U.S.C. 101 must (1) be tied to a particular machine or apparatus, or (2) transform a particular article to a different state or thing.

¹ *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

² *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

This is referred to as the “machine or transformation test”, whereby the recitation of a particular machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility (See *Benson*, 409 U.S. at 71-72), and the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity (See *Flook*, 437 U.S. at 590”). While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform an article nor are positively tied to a particular machine that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. That is, regarding independent claim 1, the claim’s limitations do not significantly tie to a particular machine and also do not involve in a “physical or chemical transformation” or a “qualifying data transformation” since the claims’ steps do not represent a physical/real object or depict the modified data as an external representation of the physical object or substance, such as but not limited to a visual display. The amendments to the claims do not overcome the 35 U.S.C. 101 rejections advanced in the Examiner's Answer because 1) the step of using an "image device" to capture imagery of a scene is associated with insignificant pre-processing, and does not serve to tie the process to a particular machine, and 2) the "depth map generator" is not claimed to include any particular structural/hardware element, and may be implemented in terms of software alone, and thus does not serve to tie the process to a particular machine. Further, the process does not recite a qualifying data "transformation" because there is no output, or "depiction" of modified data commensurate with *In re Abele* as describe by the *In re Bilski* court.

The examiner suggest amending the claims to tie to a particular machine such as “computer” or “image processor (or similar in scope) to the “meaningful and significant

steps/limitations” of the claims. Any amendment to the claims should be commensurate with its corresponding disclosure.

Other claims are rejected because they are dependent on the independent claims.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 7, 13-14, 16, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awe Franke et al. Autonomous Driving Goes Downtown, I.E.E.E. Intelligent Systems, 1998, pages: 40-48, and further in view of Nicolas et al. U.S. Patent No. 7,139,423.

Regarding claim 1, Franke teaches a method of detecting an imminent collision (page 40, column 1) comprising the steps of:

Capturing and preprocessing imagery of a scene proximate a platform (capture region of interest of image prior to the application of intensive algorithms to recognize object)(page 42, second column, Object recognition) using an imaging device (page 41, column 2, second paragraph);

Producing from the imagery a depth map (2D depth map) (page 41, column 3, last 3 lines);

Performing at a collision detector (page 41, column 1) the steps of tessellating the depth

map into a number of patches and selecting a plurality of the patches of the depth map for processing (the selection of rectangular boxes of point features/patches to generate depth map) (FIG. 4 and page 42, column 1), wherein said processing comprise classifying the selected plurality of patches of the depth map into a plurality of classes based on said position data ("longitudinal as well as lateral directions" of objects) (page 41, column 1, "detect and classify different additional traffic participants, such as bicyclists or pedestrians;"; page 41, column 1, "A polynomial classifier subsequently classifies detected lane boundaries as curbs, markings, or cluster."; and page 44, column 2, "The classification stages involves color, shape, and pixel values."); detecting a potential threat in the tessellated depth map during the processing of the selected plurality of the patches (page 42, column 1, and FIG. 4) (page 41, first column, "stereo-based obstacle detection and tracking", first paragraph; page 41, third column, last paragraph);

Estimating the size of the detected potential threat (object's width) (page 42, column 1, second paragraph);

Estimating the position of the detected potential threat (page 42, column 2, first 5 lines);

Estimating the velocity of the detected potential threat (motion/speed/acceleration estimation) (page 42, column 1 and column 2);

Performing a trajectory analysis of the detected potential threat using the estimated position and the estimated velocity (road recognition) (page 42, column 3, Road Recognition to page 43, column 1); and

Performing a collision prediction based on the trajectory analysis (estimation of relevant traffic and potential obstacles) (page 41, column 1).

Franke further discloses a concept of generating 3D position data (3D map of the environment including position of traffic participants) (page 41, column 1). Franke does not explicitly teach a depth map generator, wherein each pixel in the depth map has associated 3D position data and processing classification based on said 3D position data. Nicolas teaches an image classification (column 4, lines 6063) processing method wherein generate a depth map has associated 3D position data (abstract) wherein each pixel in the depth map has associated 3D position data (FIG. 2 and column 1, line 65 to column 2, line 4). Modifying Franke's method of using depth map for classification purpose according to Nicolas would be able to generate depth map, wherein each pixel in the depth map has associated 3D position data and processing classification based on said 3D position data. This would improve processing because it would be able to classify scenery and improve navigation (column 1, lines 25-30 and column 2, lines 45-47) and therefore, it would have been obvious to one of the ordinary skill in the art to modify Franke according to Nicolas.

For claim 2, Franke discloses the method further including determining if a collision is imminent based on the collision prediction (obstacle detection) (page 41, column 3, last 3 lines and page 47) and on the estimated size (object's width) (page 42, column 1, second paragraph) of the potential threat.

Referring to claim 3, Franke also teaches a method further including filtering the estimated position and filtering the estimated velocity before performing trajectory analysis (Kalman Filter to estimate motion/speed/acceleration (page 42, column 1 and column 2);

For claim 4, Franke teaches the method wherein the filtering includes Kalman Filtering (page 41, column 3).

Regarding claim 5, Franke further discloses the method wherein estimating the velocity of the detected potential threat includes the step of identifying 2-dimensional feature correspondences from imagery produced in different frames (2D depth map to track cluster of image frame to frame) (page 41, column 3, last 3 lines to page 42, column 1).

For claim 7, Franke teaches the method wherein estimating the velocity of the detected potential threat further includes the step of estimating velocity using Random Sample Consensus (arbitrary data) (page 43, column 1).

Regarding claim 13, please refer back to claims 1 and 2 for the teachings and explanations.

For claim 14, Franke teaches the system wherein said collision detector includes a filter for filtering image noise and outliers from said estimated position and from said estimated velocity before performing trajectory analysis (Kalman Filter) (page 41, column 3).

Referring to claim 16, Franke teaches the system further including a host vehicle, wherein said image preprocessor comprises a stereo image preprocessor (image taken before processing) and said imaging device comprises a stereo camera pair is mounted in fixed locations relative to said host vehicle (page 41, column 2, second paragraph and FIG. 1).

Regarding claim 20, please refer back to claim 1 for the teachings and explanations. In addition, Franke teaches a computer readable medium having stored thereon a plurality of instructions, the plurality of instruction including instructions which, when executed by a processor causes the processor to perform the claimed limitations (computers to run program including instructions) (page 47, column 3).

For claims 21-22, please refer back to claims 3 and 5 for the teachings and explanations.

3. Claims 6, 15 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Awe Franke et al. Autonomous Driving Goes Downtown. I.E.E.E. Intelligent Systems, 1998, pages: 40-48 and Nicolas et al. U.S. Patent No. 7,139,423 as applied to claim 1 above, and further in view of Ming Yang et al. Vision-based Real-time Obstacles Detection and Tracking for Autonomous Vehicle Guidance. Real-time Imaging VI, Proceedings of SPIE Vol. 4666, pages 65-74, 2002.

Regarding claim 6, Franke teaches the 3D map of the environment and 2D depth map (page 41, "Stereo-based obstacle detection and tracking", first paragraph) in estimating the velocity of detected of potential threat. However, Franke does not explicitly teach the obtaining 3D correspondences from the 2-dimensional feature. Ming teaches a system for obstacles detection and tracking for autonomous vehicle guidance which shows that it is well known to extract 3D information from 2D images for visual guidance (page 65, Introduction, second paragraph). Modifying Franke's method of detecting collision would able to further provide the flexibility for visual guidance in detecting obstacles. This would improve processing and therefore, it would have been obvious to one of the ordinary skills in the art to modify Franke according to Ming.

Regarding claims 15 and 23, please refer back to claims 5 and 6 for the teachings and explanations.

Allowable Subject Matter

1. Claims 17-19, 24-26, and 27-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
2. Claims 8-12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Contact Information

1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN Q. LE whose telephone number is (571)272-7424. The examiner can normally be reached on 8:30 A.M - 5:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/766,976
Art Unit: 2624

Page 10

/Brian Q Le/
Primary Examiner, Art Unit 2624
Monday, March 16, 2009